NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 3	05000249	1 OF 7

TITLE (4)
Out Of Tolerance Anticipated Transient Without Scram Time Delay Relay Due To Inadequate "As Found" Calibration Check Method

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	06	96	96	-- 012 --	00	10	07	96	None	
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(iii)		73.71(b)
	20.2203(a)(1)		20.2203(a)(3)(ii)		50.73(a)(2)(iv)		73.71(c)
	20.2203(a)(2)(i)		20.2203(a)(4)	X	50.73(a)(2)(v)		OTHER
	20.2203(a)(2)(ii)		50.36(c)(1)		50.73(a)(2)(vii)		(Specify in Abstract below and in Text, NRC Form 366A)
	20.2203(a)(2)(iii)		50.36(c)(2)		50.73(a)(2)(viii)(A)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)		50.73(a)(2)(viii)(B)		
	20.2203(a)(2)(v)		50.73(a)(2)(ii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
T. Leffler Ext. 2349	(815) 942-2920

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

With Unit 3 shutdown, and Unit 2 operating, the Unit 3 Instrument Surveillance "as found" values for three of the four low-low reactor level Anticipated Transient Without Scram (ATWS) time delay relays were found outside of the Technical Specification tolerance. The relays were replaced. The out of tolerance relays were tested by an off-site laboratory which found them to operate correctly. Root cause of the failure was inadequate "as found" calibration check methodology. However the "as left" calibration check method for setting of the relays was verified to produce Technical Specification operable ATWS channels. Immediate corrective actions included retesting of Unit 3 newly installed relays using an improved method of calibration. Long term corrective actions included revision of the testing methodology. The safety significance of the event was determined to be minimal.

EVENT IDENTIFICATION:

Out Of Tolerance Anticipated Transient Without Scram Time Delay Relay Due To Inadequate "As Found" Calibration Check Method

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: September 6,1996 Event Time: 2030 hrs.

Reactor Mode: N Mode Name: Cold Shutdown Power Level: 0%

Reactor Coolant System Pressure: 0 psig

B. DESCRIPTION OF EVENT:

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(v)(D) which requires the reporting of any condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. At 0215 on September 7, 1996 the ATWS relay out of tolerance condition was determined to be reportable by the Shift Manager. Notification of the event was performed pursuant to 10CFR72(b)(2)(iii)(D) at 0357 (EDT) on September 7, 1996 through Emergency Notification System (ENS) number 30978.

On September 6, 1996, an Instrument Maintenance (IM) Control System Technician (CST) performed routine Dresden Instrument Surveillance (DIS) 0260-06, "Unit 3 ATWS Transmitter and Master Trip Unit Calibration and Logic System Functional Test". Using this procedure the "as found" values were recorded with a single stopwatch check. Three of the four low-low reactor level RPT ATWS time delay relays were found outside of the Technical Specification (TS) tolerance of 8 to 10 seconds with this method. Calibration check values were as follows:

Relay	As Found Values
K101A	In Spec
K101B	12.4 sec
K101C	10.6 sec
K101D	34.4 sec

The initial "as found" calibration check 34.4 second value observed on relay K101D is attributed to circuit interaction internal to the Master Trip Unit (MTU) when the trip signal was injected using the old calibration check method.

The Instrument Maintenance (IM) Control System Technician (CST) proceeded with the procedure, adjusting the relays to achieve 9.0 +/- 0.25 seconds. The adjustment range of 0.0 to 30.0 seconds is accomplished with one-half turn of a one-eighth inch diameter potentiometer. The IM CST adjusted the relays and reperformed the timing check evolution without success. Because of this inability to achieve satisfactory repeatability within the specified setting, the IM CST elected to replace all four relays, believing them to be defective. New relays were obtained, calibrated and installed per DIS 0260-06. The "as left" values were as follows:

Relay	New Relay As Left Values
K101A	9.06
K101B	9.02
K101C	8.82
K101D	8.99

Due to the out of tolerance "as found" values, and the fact that these relays had been replaced approximately 18 months earlier, the relays were removed from the plant and sent to a ComEd off-site laboratory (C-Team Facility) for analysis.

The results of the C-Team Facility testing indicated that the relays functioned adequately. The vendor specified a ± 5% repeat accuracy (5% of setting value). The C-Team Facility observed a repeat accuracy of between 0.00% to 0.08% during the 5-cycle test initially performed on the relays, verifying that the relays were functioning as specified by the vendor.

On September 14, 1996, IMD completed WR 960085404-01 to again check the time delay of the newly installed (9/6/96) K101 series relays. The testing methodology utilized during the check involved a chart recorder to monitor the time between time delay relay coil energization and time delay relay output contact closure. The purpose of this "as found" calibration check was to determine if the repeated stopwatch method was capable of setting the time delay relays to ensure Technical Specification operability of the ATWS trip channels. The results of the September 14, 1996 three consecutive timing results using strip chart timing methodology were as follows:

Relay	Result #1	Result #2	Result #3
K101A	8.44 sec	8.46 sec	8.46 sec
K101B	8.26 sec	8.26 sec	8.26 sec
K101C	7.90 sec	7.90 sec	7.90 sec
K101D	8.20 sec	8.18 sec	8.20 sec

This showed that the repeated stopwatch method was capable of setting the time delay relays to ensure Technical Specification operability of the ATWS trip channels. Although the results of the testing showed that one of the relays was again outside of the desired band, both ATWS Divisions were determined to be operable and each channel would have independently produced an RPT/ARI signal within technical specification limits. This shift in values is attributed to the elimination of human judgement and reaction time from the calibration check methodology. The stopwatch calibration check methodology involved injecting a trip signal to the MTU, and measuring the time from when an LED indicator came on, indicating a trip signal was present, until a contact on the time delay relay closed, as indicated on a digital multimeter, using a stopwatch.

Initial ATWS relay calibration and subsequent calibration check method.

When initially calibrating these relays, the "as left" data for the procedure is collected by repeating the timing evolution several times which statistically validates that the relay is properly set. The repeat of a calibration check signal is not an acceptable practice to obtain "as found" values and is not done during the periodic calibration check. The "as found" results for this LER were subject to the variability of the calibration check method without validation by repeating the performance. Because of this, the calibration check method for determining "as found" values is less accurate and may determine that an acceptable relay is outside of the acceptable range. The "as left" values are recorded after several cycles. This ensures acceptably repeatable "as left" values.

The C-Team testing results have shown that the relays which were checked on September 6, 1996 performed satisfactorily in the laboratory and probably were performing adequately in the plant.

The new method of both initially calibrating and subsequent calibration check testing time delay relays using a chart recorder and/or contact tester, is an enhancement to the testing program which produces more reliable and accurate results by eliminating human response and judgement time errors and significantly reduces test equipment response time errors.

Unit 2 Considerations

The September 14 1996 Unit 3 testing showed that the stopwatch ATWS relay setpoint calibration method used in January 1996 on the Unit 2 relays was adequate to set the ATWS relays. It has been determined that Unit 2 ATWS relays were left operable per the stopwatch method, which was validated to produce correct "as left" results by the Unit 3 test.

Relay Materiel Condition Considerations

The low-low reactor level time delay relays are normally de-energized. The vendor specifies a qualified life of 25,000 electrical operations or 10 years from manufacture, which ever comes first. This ten year limitation is set due to the limited vendor testing. Although three of the relays removed were outside of the 10 years from date of manufacture, C-Team certified that the relays were acceptable compared to vendor supplied design data (Tech Eval M-1996-813-00). Quad Cities design calculation Calc No. QDC-263-E-0037, rev 1, identifies a 40 year qualified life for (F)TR and ETR type relays. Many relays of this type are in use at many stations. Their performance (as tested electronically in the field) has been satisfactory. As a conservative measure to validate these analyses, an enhanced performance monitoring of these relays will be developed and implemented (corrective action E.3).

C. CAUSE OF EVENT:

The cause of this event is a Management Deficiency (NRC Cause Code E) in that the station surveillance testing program was inadequate in developing an adequate calibration check method of testing the ATWS relays. The stopwatch calibration check method was not sensitive enough to allow technicians to gather "as found" data.

D. SAFETY ANALYSIS:

The safety significance of this event is minimal due to the fact that the RPS system was operable during the event and the high pressure RPT/ARI trip was available.

In addition, ComEd Nuclear Fuel Services has provided an analysis, NFS:BSA:96-097, which states that the time delay provided by these relays can safely vary from 7.0 to 11.0 seconds. Division I of ATWS would have tripped at 10.6 seconds after an initiation signal, causing the RPT/ARI within ATWS bounding parameters.

Section 7.8.3.1 of the UFSAR specifies that ATWS will automatically trip both recirculation pump M-G set field breakers on a two out of two logic in either of two channels upon either continuous low-low reactor water level for 9 seconds or on high reactor pressure. In addition, a performance characteristic of < 0.53 seconds for circuit logic delay from sensor to collapse of the generator field is identified.

The ATWS system monitors plant parameters which would indicate an abnormal transient is in progress and/or the Reactor Protection System (RPS) has failed to provide plant protection. The two parameters that actuate the ATWS system are low-low reactor vessel water level and high reactor vessel pressure.

On a low-low reactor water level (-59 inches) initiation signal, the ATWS system actuates to trip the reactor recirculation pumps following a nine second time delay. The nine second time delay is consistent with the assumption in the Loss of Coolant Accident (LOCA) analysis. The inertia of the motor-generator set will provide short term pumping capability following a recirculation pump motor trip. If the trip occurs at the field breaker of the motor of the motor-generator set, the inertia of the motor-generator is no longer available to prolong the pumping capability. The nine second time delay is used to compensate for this loss of pumping capability, thus satisfying the LOCA analysis for a reactor low-low water level trip. The recirculation pumps [AD] are tripped in order to reduce flow through the core rapidly, thereby providing an initial reduction in core power at the same time that the time delay is energized for the recirculation pumps, the ATWS circuit energizes the Alternate Rod Insertion (ARI) solenoid valves to depressurize the Control Rod Drive (CRD) [AA] scram air header, and Scram Discharge Volume (SDV) air header. The valve initiation circuit is sealed-in for 39 seconds, which is sufficient time for all control rods to insert fully.

When actuated by a high reactor pressure signal (1240 psig), the ATWS system operates to trip the reactor recirculation pumps immediately and to energize the ARI valves. The nine second time delay is not required on a high pressure actuation of the ATWS system. Increasing pressure in the vessel causes a void reduction in the core; this in turn causes reactor power to increase. The increasing power causes more steam to be produced, which increases pressure still further, thereby causing a further power increase. Any time delay would allow this cycle to develop further and increase the danger of core damage.

The ATWS system is designed as a redundant, independent and diverse reactor shutdown system which provides a backup function for the RPS. The ATWS system is divided into two divisions, each division being capable of performing the system's function. Each division of the ATWS system is physically and electrically separated from each other. This ensures that a failure, or partial failure, of one ATWS division will not affect the operation of the other. The system is designed so that a single component failure will not inadvertently initiate the system or prevent the ATWS system from accomplishing its function.

The safety significance is minimal. RPS and high pressure ATWS initiation was operable during the period in which ATWS Reactor low low water level initiation was inoperable. Although the ATWS system would not have initiated on a low-low reactor water level of -59 inches after a 9 second time delay, it would have initiated at 32.2 seconds. Additionally, a low low reactor water level would have tripped both reactor recirculation pumps [AD] motor breakers immediately. In approximately 8 seconds after reactor water level reached -59 inches the LPCI loop select logic would have tripped both reactor recirculation pump motor breakers. However, for reactor low water level conditions a reactor scram signal would have been initiated at +8 inches reactor water level as opposed to -59 inches automatic actuation of the ATWS system. In addition, Dresden Emergency Operation Procedure (DEOP) 100, "Reactor Control", directs the operators to manually scram the reactor if the reactor fails to scram from a valid scram signal. If the manual scram fails and the reactor power is greater than 6 percent, the operator would exit DEOP 100 and enter DEOP 400-5, "Failure to Scram".

In conclusion, since the manual ARI circuit was operable when DEOP 400-5 is performed, the ATWS system would generate a reactor recirculation pump trip and then energize the ARI valves to insert all operable control rods to shutdown the reactor.

E. CORRECTIVE ACTIONS:

1. A standard procedure has been developed to check ATWS relay time delay using test equipment appropriate for the ATWS time delay relay configuration. (complete)

2. Review other procedures which check time delay relays and revise them as required to ensure that the testing methodology is appropriate for the installed configurations. (2371809601201)

3. Perform a performance monitoring program for the ATWS relays to verify that the relays are performing adequately using the new testing methodology. This will involve increasing the frequency of checking the time delay of these relays for performance trending. Program will last for one year. (2371809601202)

F. PREVIOUS OCCURRENCES:

LER/Docket Number	Title
94-008/05000249	Anticipated Transient Without Scram (ATWS) Trip Time Delay Failure Due to Management Deficiency

On 03/11/94, during the performance of Dresden Instrument Surveillance (DIS) 0260-06, "Anticipated Transient Without Scram (ATWS) Transmitter and Master Trip Unit Calibration and Logic System Functional Test", time delay relay 3-0260-K101D tripped at 32.29 seconds and relay 3-0260-K101C failed to time out. The relay failures were a result of component aging and cycling. Under Work Request D21641, both relays were removed and replaced. The root cause of this event was incomplete corrective actions from a previous event. The original relays were not replaced in a timely manner. Corrective actions included replacement of the relays and enhancements to the controls associated with implementing corrective actions and commitments.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
Amerace/Agastat	Relay	FTR14B3CC750	164C5257P013
Amerace/Agastat	Relay	ETR14B3CC2004003	169C9488P213